

Remarks

Claims 1-27 are pending in the above captioned application. Claims 1-27 have been rejected. The Examiner has rejected claims 1-26 for non-statutory double patenting, over Application S.N. 10/012,002, Published Application No. 2002/0254668 A1, published on October 24, 2002, assigned to the assignee of the above captioned application, Attorney Docket No. 2001-0090-01 ("Knowles").

Applicants do not concede that all of the claims in the above captioned application are subject to rejection for obviousness double patenting, e.g., claims 21-26. Nevertheless, applicants have filed along with this amendment a terminal disclaimer. This should render the Examiner's rejection of claims in the above captioned application for obviousness double patenting improper and applicants respectfully request that the Examiner withdraw the rejection of claims 1-27 and allow claims 1-26.

The Examiner has rejected claims 27 as unpatentable under 35 U.S.C. §102 (a) over United States Patent No. 6,281,471, entitled ENERGY-EFFICIENT LASER-BASED METHOD AND SYSTEM FOR PROCESSING TARGET MATERIAL, issued to Smart on August 28, 2001 ("Smart").

Smart relates to a laser system producing:

amplified pulses [having] a substantially square temporal power density distribution, a sharp rise time, a pulse duration and a fall time. The system further includes a beam delivery and focusing subsystem for delivering and focusing at least a portion of the amplified pulse train onto the target material. The rise time (less than about 1 ns) is fast enough to efficiently couple laser energy to the target material, the pulse duration (typically 2-10 ns) is sufficient to process the target material, and the fall time (a few ns) is rapid enough to prevent the undesirable changes to the material surrounding the target material. (Abstract)

In addition, Smart notes the disclosed "invention relates to energy-efficient, laser-based methods and systems for processing target material." (Col. 1, lines 17-18) Further, states Smart he is utilizing a "compact, gain switched laser system which has the capability for generating sub-nanosecond rise time pulses having short duration of a few nanoseconds and rapid fall time." (Col. 6, lines 47-50) In addition it is noted in Smart that:

In carrying out the above objects and other objects of the present invention, an energy-efficient, laser-based method for processing target material having a specified dimension in a microscopic region without causing undesirable changes in electrical or physical characteristics of material surrounding the target material is provided. The method includes generating a laser pulse train utilizing a laser having a wavelength at a repetition rate wherein each of the pulses of the pulse train has a predetermined shape. The method then includes optically amplifying the pulse train without significantly changing the predetermined shape of the pulses to obtain an amplified pulse train. Each of the amplified pulses has a substantially square temporal power density distribution, a sharp rise time, a pulse duration and a fall time. The method also includes delivering and focusing at least a portion of the amplified pulse train into a spot on the target material wherein the rise time is fast enough to efficiently couple laser energy to the target material, the pulse duration is sufficient to process the target material and the fall time is rapid enough to prevent the undesirable changes to the material surrounding the target material. (Col. 8, lines 6-18)

Finally it is noted in Smart:

In a preferred construction of the invention, the gain-switched pulse shape includes a fast rise time pulse, substantially flat at the top, with a fast pulse fall time. A 'seed' laser diode is directly modulated to generate a predetermined pulse shape. The optical power is increased through amplification with a fiber laser amplifier to output power levels sufficient for laser processing. The resulting gain-switched pulse at the fiber laser amplifier output is focused onto the target region

In a construction of the invention, it can be advantageous to directly modulate the 'seed' diode to produce a predetermined gain-switched square pulse and provide low distortion amplification using a fiber laser amplifier to provide output pulse levels sufficient for material processing.

In an alternative construction, the pulse temporal power distribution of the directly modulated seed diode is modified to compensate for distortion or non-uniformity of the fiber amplifier or other components, for instance the 'smooth' rise of an output modulator. The resulting laser processing pulse which is focused into the target region will have a desired shape: fast rise time, relatively flat during the pulse

duration, with rapid decay.

In a construction of the invention it can be advantageous to enhance the performance of the laser processing system by providing a 'pulse slicing' module which is used to attenuate laser energy remaining at the output of the laser processing system when the 'seed' laser pulse is terminated, thereby preventing heating of sensitive structures not designated as target material after processing is complete.

This is not the claimed invention as recited in claim 27 of the above-captioned application:

process for controlling discharge timing of a burst of pulses ... comprising the steps of determining the timing of discharges to produce said pulses based on a feedback discharge timing signal wherein at least a first set of discharges at the start of said burst of pulses are programmed to occur at relative times so that no significant lasing results as a consequence of the discharge.

Neither do any of the portions of Smart specifically referenced by the Examiner disclose this claimed process nor recognize the reasons for the need for this process in MOPA lasers of, e.g., the gas discharge type, e.g., as discussed in the specification of the above captioned application, e.g., at pp. 20, line 15 – 23, line 31.

For the above stated reasons the Examiner's rejection of claim 27 under 35 U.S.C., §102 (a) is not proper. The Examiner is respectfully requested to withdraw the rejection of claim 27 and allow claim 27.

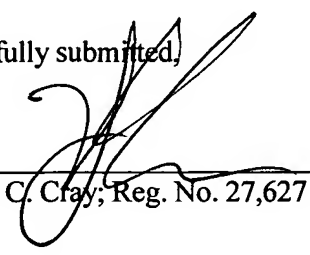
Claim 27 has been amended to correct grammatical errors, without changing the substance of the claim.

For the above stated reasons, Applicants submit that the Examiner's rejection of claims 1-27 is improper and Applicants respectfully request that the Examiner withdraw the rejection of claims 1-27 and allow claims 1-27.

Conclusion

No fee is believed to be due in connection with the filing of this paper. If any fee is required by the filing of this paper, The Commissioner is hereby authorized to charge any fees, or to credit any overpayment to Deposit Account No. 03-4060.

Respectfully submitted,



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